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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,575	10/16/2003	J. Elon Graves	23236-07284	2479

758 7590 06/26/2007

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EXAMINER	
PHAN, HANH	
ART UNIT	**PAPER NUMBER**
2613	

MAIL DATE	DELIVERY MODE
06/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/688,575	GRAVES ET AL.	
	Examiner	Art Unit	
	Hanh Phan	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22 and 24-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9,16-22,25-29,33,34,38-42 and 44* is/are rejected.

7)☒ Claim(s) *8, 10-15, 24, 30-32, 36, 37 and 43* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 04/16/2007.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 16-22, 25-29, 33, 34, 38-42 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimmler et al (Pub. No.: US 2003/0067657 A1) in view of Presby et al (Pub. No.: US 2003/0001073 A1).

Regarding claims 1 and 34, referring to Figures 1, 2 and 7-9, Dimmler teaches a device (i.e., transceiver 24, Fig. 2) for wavefront sensing and data detection, the device (i.e., transceiver 24, Fig. 2) comprising:

an optical-to-electrical converter (i.e., communication receiver 68, Fig. 2, pages 2 and 3, paragraphs [0023]-[0028]) for receiving an optical beam (i.e., optical beam 64, Fig. 2) encoded with data and converting the optical beam to an intermediate electrical signal, the intermediate electrical signal containing the data and further containing wavefront information sensed from a wavefront of the optical beam by the optical-to-electrical converter (i.e., in Fig. 2, pages 2 and 3, paragraph [0027], Dimmler et al teaches the optical beam will not only carry communication data, but will also carry wavefront information and the communication receiver converts the optical beam into an

electrical signal containing the data signal and wavefront information and using a known extraction method to extract the data signal and the wavefront information, and the wavefront information is transferred to the wavefront processor 62 for processing and the data signal is transferred to the data encoding/decoding electronics 28); and

a module coupled to the optical-to-electrical converter for generating an electrical wavefront signal and an electrical data signal from the intermediate electrical signal, the electrical wavefront signal containing the wavefront information and the electrical data signal containing the data (i.e., in Fig. 2, inherently, there is an element in the communication receiver 68 to extract the wavefront information and the data signal, pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

Dimmler et al differs from claims 1 and 34 in that he fails to teach a separating module coupled the optical-to-electrical converter for generating an electrical wavefront signal and an electrical data signal from the intermediate electrical signal. Presby et al, from the same field of endeavor likewise teaches an apparatus for the correction of the optical signal wavefront distortion within a free space optical communication system (Figure 4). Presby et al further teaches a separating module (i.e., receiver 433, Fig. 4) coupled the optical-to-electrical converter (i.e., photodector 411, Fig. 4) for generating an electrical wavefront signal and an electrical data signal from the intermediate electrical signal (i.e., pages 2 and 3, paragraphs [0018]-[0023]). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the separating module coupled the optical-to-electrical converter for generating an electrical wavefront signal and an electrical data signal from the

intermediate electrical signal as taught by Presby et al in the system of Dimmler et al. One of ordinary skill in the art would have been motivated to do this since allowing compensating for wavefront distortion of a light beam and reducing the distortion of the received signal.

Regarding claims 2 and 3, the combination of Dimmler et al and Presby et al teaches the optical-to-electrical converter comprises: a photodetector (i.e., photodetector 411 in Fig. 4 of Presby et al).

Regarding claim 16, referring to Figures 1, 2 and 7-9, Dimmler teaches an adaptive optics module for wavefront correction and data transmission, the adaptive optics module comprising:

a combined wavefront/data sensor (i.e., ., communication receiver 68, Fig. 2, pages 2 and 3, paragraphs [0023]-[0028]) for receiving an optical beam encoded with data and generating an electrical wavefront signal and an electrical data signal from the optical beam, the electrical wavefront signal containing wavefront information sensed from a wavefront of the optical beam by the combined wavefront/data sensor and the electrical data signal containing the data; and

a variable phase device (i.e., deformable mirror 48, Fig. 2) coupled to the combined wavefront/data sensor and located in an optical path of the optical beam, the variable phase device for introducing an adjustable phase in the optical path in response to the electrical wavefront signal (i.e., pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

Regarding claims 17, 29, 38 and 42, Dimmler further teaches the combined wavefront/data sensor comprises: an optical-to-electrical converter for receiving the optical beam and converting the optical beam to an intermediate electrical signal, the intermediate electrical signal containing the data and the wavefront information sensed from a wavefront curvature of the optical beam by the optical to electrical converter; and a separation module coupled to the optical-to-electrical converter for generating the electrical wavefront signal and the electrical data signal from the intermediate electrical signal (i.e., Fig. 2, pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

Regarding claims 18, 33, 39 and 44, Dimmler teaches further comprising: a transmitter (i.e., transmitter 33, Fig. 2) for generating a counter-propagating data-encoded optical beam, wherein the transmitter is located so that the variable phase device pre-corrects the counter-propagating data-encoded optical beam.

Regarding claims 19-21, 40 and 41, Dimmler further teaches the variable phase device comprises: a deformable mirror (Fig. 2, pages 4 and 5, paragraphs [0045]-[0054]).

Regarding claim 22, Dimmler further teaches the wavefront information includes wavefront curvature (i.e., Fig. 2, pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

Regarding claim 25, Dimmler teaches further comprising: telescope optics for collecting the optical beam (Fig. 2).

Regarding claim 26, Dimmler further teaches the adjustable phase corrects only for aberrations that are of equal or lesser order than tip/tilt (i.e., Fig. 2, pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

Regarding claim 27, Dimmler further teaches the adjustable phase corrects for at least one aberration that is of equal or greater order than focus (i.e., Fig. 2, pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

Regarding claim 28, Dimmler further teaches the optical beam comprises a primary beam encoded with the data and a co-propagating probe beam; and the combined wavefront/data sensor comprises: a first detector layer sensitive to a wavelength of the primary beam, for converting the primary beam to the electrical data signal; and a second detector layer sensitive to a wavelength of the probe beam and overlapping with the first detector layer, the second detector layer for converting the probe beam to the electrical wavefront signal (i.e., Figs. 7-9 and pages 2 and 3, paragraphs [0023]-[0028] and page 5, paragraphs [0049]-[0057]).

5. Claims 4-6, 9 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimmler et al (Pub. No.: US 2003/0067657 A1) in view of Presby et al (Pub. No.: US 2003/0001073 A1) and further in view of Devon (US Patent No. 5,546,211).

Regarding claims 4-6, 9 and 35, the combination of Dimmler et al and Presby et al teaches all the aspects of the claimed invention as set forth in the rejection to claims 1 and 34 above excepts fails to specifically teach within the intermediate electrical signal, the wavefront information and the data are separated in frequency and the

separation module separates the wavefront information and the data on the basis of frequency. Devon, from the same field of endeavor, likewise teaches an optical wireless receiver for receiving an infrared data signal (Fig. 2). Devon further teaches the optical wireless receiver comprising a highpass filter for selecting the high frequency signal and a lowpass filter for selecting the low frequency signal (i.e., Fig. 2, col. 4, lines 35-67 and col. 5, lines 1-42). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the optical wireless receiver including a highpass filter and a lowpass filter as taught by Devon in the system of the combination of Dimmler et al and Presby et al. One of ordinary skill in the art would have been motivated to do this since allowing selecting the wanted signal and eliminating the unwanted signal.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dimmler et al (Pub. No.: US 2003/0067657 A1) and Presby et al (Pub. No.: US 2003/0001073 A1) in view of Devon (US Patent No. 5,546,211) and further in view of Hirohashi et al (US Patent No. 5,532,858).

Regarding claim 7, the combination of Dimmler et al, Presby et al and Devon teaches all the aspects of the claimed invention as excepts fails to specifically teach the data is encoded with a zero DC component. Hirohashi, from the same field of endeavor, likewise teaches an optical wireless receiver for receiving an infrared data signal (Figs. 1-15). Hirihashi further teaches the data is encoded with a zero DC component (i.e., Figs. 15A and 15B, col. 1, lines 57-67 and col. 1, lines 1-6). Based on this teaching, it

would have been obvious to one having skill in the art at the time the invention was made to incorporate the data is encoded with a zero DC component as taught by Hirohashi in the system of the combination of Dimmler et al, Presby et al and Devon. One of ordinary skill in the art would have been motivated to do this since allowing the coded data signals contain no direct current (DC) component and permitting easy and complete synchronization.

Allowable Subject Matter

7. Claims 8, 10-15, 24, 30-32, 36, 37 and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments with respect to claims 1-22 and 24-44 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

HANH PHAN
PRIMARY EXAMINER